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Networking Radio Broadcast Controlled by using Audio Mute Clock

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Abstract

This paper presents the audio and transmitter controllers to switch the broadcasting programs in the automatic radio broadcast network. The audio mute clock is used to control the controllers to switch the relays on and off via Programmable Logic Control. In addition, the controllers is used to turn on and off the transmitter when it is used as unmanned operation. From the result, it is shown that the proposed controllers can be accurately used to switch the automatic broadcast program. In addition, this controllers using audio mute clock can be used without the needed of computer, master clock and human intervention. In addition, it can be used to automatically turn the transmitter on and off when it is used as unmanned operation.

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Keywords: Network Broadcast Radio, Audio Mute Clock, Master Clock, Program Logic Controller, Audio and Transmitter Controller

1. Introduction

The requirement of radio broadcast organizations is to control the network radio stations that are located at the various areas in the world by using the automation control centre to deliver the broadcast programs via satellite to the network stations. Then, the time of broadcast system must rely on the master clock to correct the clock of computer to ensure its accuracy [1]. A computer is used to control the network however, the limitation of the computer is that it is unsuitable for the restrict area for maintenances such as; in desert or dusty area. Then, the automation radio broadcast controlled using audio mute clock has been used to eliminated the restrict area problem [2]. The automated radio

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broadcast has been only used for mono-stereo switching for a broadcast program however, the broadcast station is required to broadcast more than a program. Then, this study aims to develop the radio broadcast network by using audio and transmitter controllers to automatically switch the broadcasting programs by using the audio mute clock to control the controllers via Programmable Logic Control (PLC) [3]. In addition, the controllers is also used to turn on and off the transmitter controller when it is used as unmanned operation.

2. Experiment setup

The setup of broadcast system has been described in [2] except the audio and transmitter controllers which consists of the audio sensor circuit, PLC and relay modules. The audio sensor circuit [2] is used to detect audio mute. The PLC which is the ARRAY model AF-10MR-E is used as the major controller in this system. The relay module is used to change the audio program and turn the transmitter on and off. This controllers is proposed to support the need of the FM radio station that is used as or part of network radio broadcasting as shown in the fig. 1. In addition, the broadcast system using the audio mute clock can be automatically operated without any error and no human intervention.

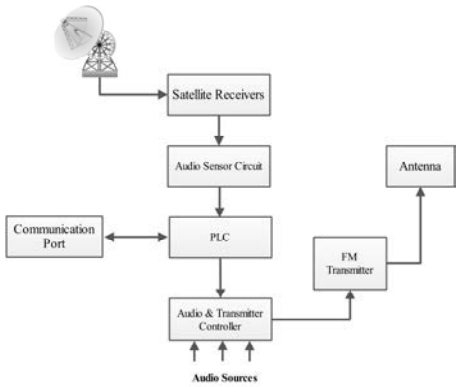

Fig. 1. Block diagram of radio broadcast network controlled by using audio mute clock

The PLC has 6 inputs and 4 outputs with built in real time clock (RTC) [1] with capacitor type as a back-up battery that can maintain the clock up to 100 hours after the disconnection from commercial power. The input (I_1) of the PLC is used to detect the audio mute from the audio sensor circuit after the ending of the program in 1-5 seconds to execute the PLC. Then, the PLC has been programmed to control audio sources and turn the transmitter on and off for beginning and ending broadcasting schedule respectively. However, these scheduled programs depend on location of transmitter site that has been assigned to carry the VOA programs which are on Program 2 and 3 with different broadcast schedule. The proposed audio and transmitter controller circuits are shown in fig. 2.

From the switching procedures, the relay used in control module is a NAIS series by Panasonic. The module is built on the printed circuit board and installed in the audio and transmitter controllers and then, wired to connectors at the rear of the controllers to the audio sources. The output (Q_1) of the PLC is programmed to energize the relay (RL_1) for the audio Program 1. The switch (SW_1) is used to disable the command from the Q_1 of PLC when the transmitter is setup to operate as unmanned operation and carry on the audio Program 2 only. The output (Q_2) of PLC switches the relay (RL_2) for the audio Program 2 then, the output (Q_3) of PLC activates the relay (RL_3) for the audio Program 3. The output (Q_4) of PLC is used to energize the relay (RL_4) that is used to turn transmitter on and off the unmanned control unit of transmitter.